BULLETIN

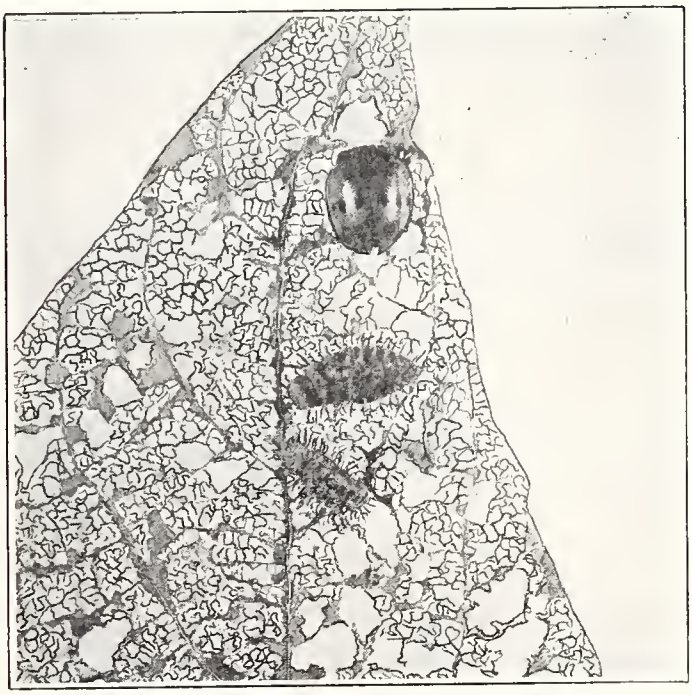
Pennsylvania Department of Agriculture

HARRISBURG

Vol. 8 December 1, 1925 No. 21

General Bulletin No. 417

MEXICAN BEAN BEETLE IN PENNSYLVANIA



Beetle and Larvae Feeding on Bean Foliage.

F. P. WILLITS, *Secretary of Agriculture*
C. H. HADLEY, *Director, Bureau of Plant Industry*

Published semi-monthly by direction of the Secretary. Entered as second class matter, March 22, 1918, at the Post Office at Harrisburg, Pa., under the Act of June 6, 1900. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized on June 29, 1913.

THIS BULLETIN AT A GLANCE

The Mexican bean beetle was found for the first time in Pennsylvania in 1924. While the known area of infestation is small, it is an insect which has spread rapidly and will likely be found throughout the State within a few years.

This insect is primarily a pest of beans, attacking the foliage of all field and garden varieties. It also feeds upon soy beans.

The squash lady beetle resembles the Mexican bean beetle in many respects and is likely to be mistaken for it. Plate III illustrates the difference between the two insects.

Spraying or dusting with poison is an effective control measure. Follow the precautions and directions as given on page 6.

Cleaning away crop remnants in infested fields as soon as the crop is harvested is an important step in control. Waste places near bean fields should be burned over to destroy hibernating forms.

MEXICAN BEAN BEETLE IN PENNSYLVANIA

By T. L. Guyton and J. N. Knull*

Bureau of Plant Industry

INTRODUCTION

The Maxican bean beetle (**Epilachna corrupta** Muls.), a primary pest of garden and field beans of various kinds, was found in Pennsylvania for the first time in 1924 (See Fig. I). Since this insect is new and not widely distributed, and the snap bean is one of the important Pennsylvania vegetable crops, the following information is made available to assist the growers of beans in the infested area in controlling this destructive pest. The publications of United States Department of Agriculture and State agencies, together with results of work by Bureau of Plant Industry, Pennsylvania Department of Agriculture, furnish the source of this information.

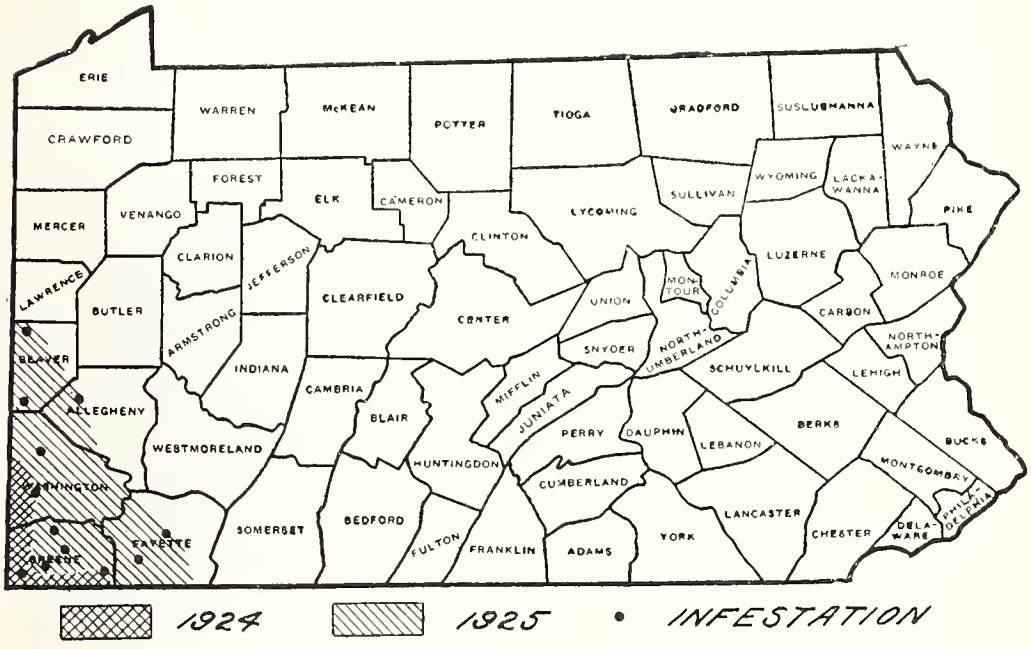


Fig. I. Map Showing Distribution of the Mexican bean beetle in Pennsylvania.

The species has been known to occur in the southwestern part of the United States for 75 years, and is supposed to be a native of southern North America. It was discovered in Alabama in 1920, when it was found firmly established near some mining towns. It is thought to have been brought in on shipments of alfalfa hay from the west, during the war period.

Since 1920 the beetle has spread rapidly northward and eastward. It probably entered Pennsylvania through West Virginia and Ohio, and has spread about twenty miles in one year.

*Photographs by H. B. Kirk.

INFESTED AREA IN PENNSYLVANIA

A hasty survey of the western and southwestern counties of the State made in the late summers of 1924 and 1925, indicates that the beetle is firmly established in Beaver, Allegheny, Washington, Greene, and Fayette Counties. Large fields of beans would often contain areas which had been destroyed by the insects, indicating that the infestation is recent, the insect not having had time to establish itself over all parts of the field.

Damage Done in Other States

When first found in Alabama, the insect was destroying all the garden beans in an area near Birmingham. In 1921 the bean crop was destroyed over a larger area, complete defoliation usually occurring in a few weeks following the attack.

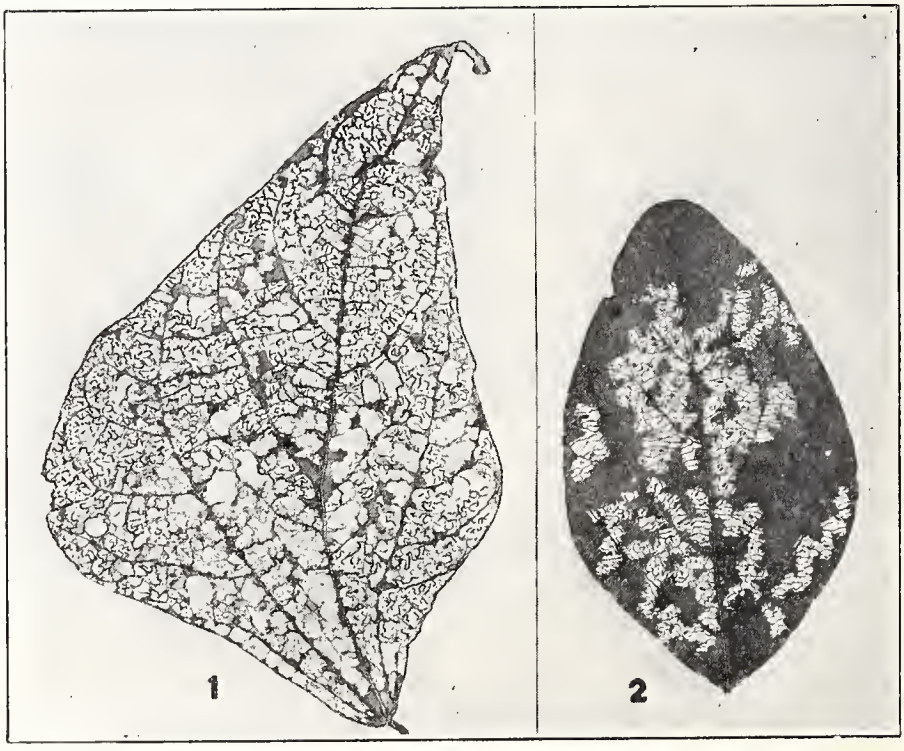


Plate I. Characteristic feeding of the Mexican bean beetle.
1. On bean foliage. 2. On beggar-tick foliage.

In Colorado it is stated that it is not uncommon to see garden and field beans in the infested area a complete failure on account of the injuries of the beetle, and very few farmers attempt to grow beans commercially.

In South Carolina in 1924 the crops of early beans were completely destroyed, and in North Carolina bush beans planted early in the season produced small crops, while all late varieties were completely destroyed. In West Virginia considerable damage was caused by the beetle in many localities. The beetle has been known in Ohio for a longer period than in Pennsylvania. There, authori-

ties say the beetle is increasing in number and is causing a very considerable loss to bean growers in the southeastern counties of that State.

Judging from the action of the Mexican bean beetle in neighboring States it seems reasonable to believe that it will continue to spread to other parts of Pennsylvania, and become a serious pest of all bean crops.

DESCRIPTION OF LIFE STAGES

The eggs (See Plate II, Fig. 2) are elliptical in shape, pale orange in color, and are laid in groups on the undersides of the leaves. Each egg is about one-sixteenth of an inch in length.

The larvae (See Plate II, Fig. 1) are greenish in color when small, but when fully mature they become dark yellow in color. the larvae are armed with rows of branched spines over the upper surface of the body.

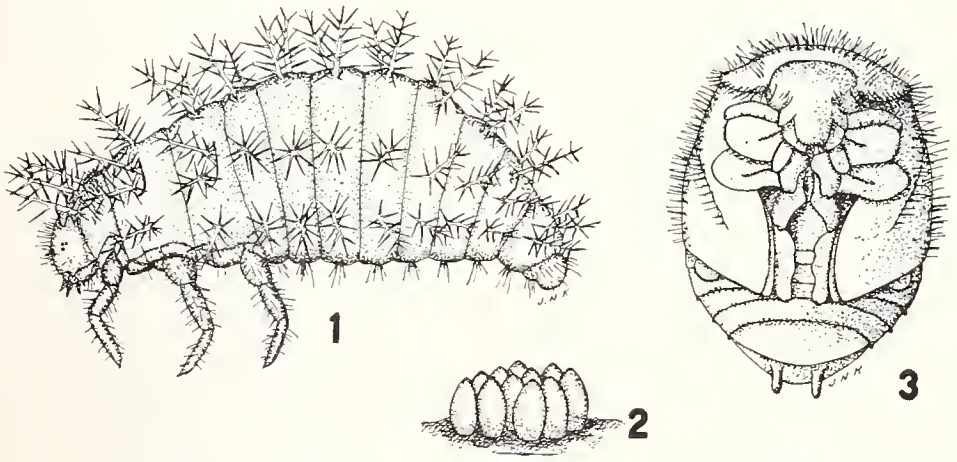


Plate II. Life stages of the Mexican bean beetle.
1. Larva. 2. Eggs. 3. Pupa.

The pupae (See Plate II, Fig. 3), are light yellow in color, about one-quarter of an inch in length; and usually hang from the under sides of the leaves, with head ends down. They are somewhat protected by the discarded larval skins.

The adults (See Plate III, Fig. 1), are yellow in color at first, but soon turn to a light brown. They are stout, convex, and are about one-quarter of an inch in length. Each wing is usually marked with eight small black spots. These spots are not constant in all specimens. The adult is often confused with the closely related squash lady beetle (**Epilachna borealis** Fab.) (See Plate III, Fig. 2). As indicated by the name, the squash lady beetle feeds on the leaves of squash and related plants. It can easily be separated from the Mexican bean beetle by the arrangement and size of the dark spots on the back of the beetle, the markings on the squash lady beetle being much larger and less numerous than those of the Mexican bean beetle.

LIFE HISTORY

In the south there are three generations each year. Farther north the number of generations is less. In North Carolina there are two full generations and a part of a third. In Ohio there seems to be two generations; the last generation is not complete. No study has been made of the life history in Pennsylvania, but it seems certain that there will be at least two generations.

The winter is spent in hibernation and only the adult lives through. They are found usually in wooded areas, though at times they may seek shelter in material found about the garden. They may collect in large groups, or may winter over a single individual in a place.

These overwintering beetles leave their hibernating quarters at about the time the beans are coming up, and begin to feed on the

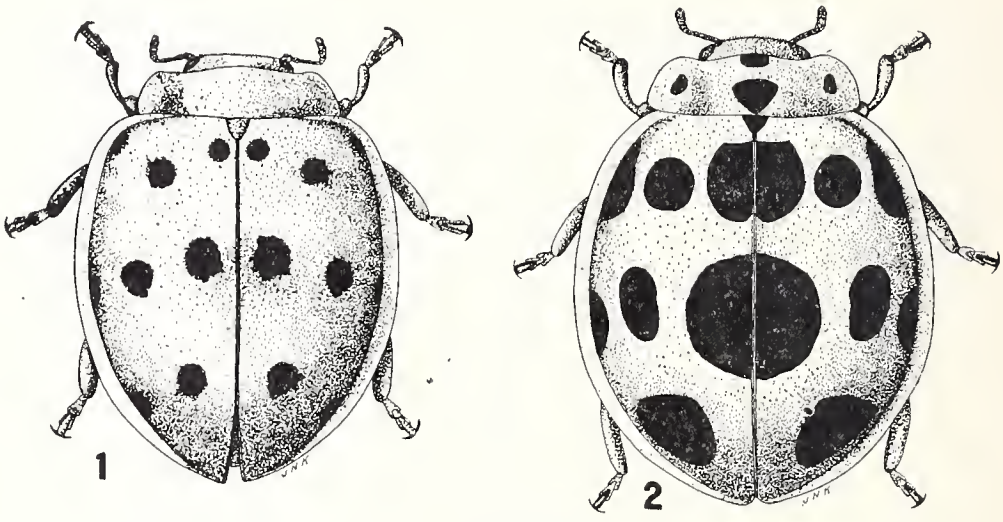


Plate III.
1. Adult of Mexican bean beetle.
2. Adult of squash lady beetle.

developing foliage. In about a week or ten days the female beetles begin laying eggs. The eggs hatch in from a week to fourteen days, depending upon the temperature. In the south the total time from egg to adult varies from twenty-five to fifty-eight days, depending on the weather. The adults seek hibernating quarters in the early fall.

NATURE OF INJURY TO PLANTS

The larvae and beetles feed on the leaves of beans, skeletonizing the leaves in characteristic patterns. The leaves fall off soon after they have been fed upon, and only the naked stems are left in a heavily infested field. The cover page and Plate I illustrate the characteristic feeding of the Mexican bean beetle.

FOOD PLANTS

The beetle attacks garden beans of all kinds, soybeans, cowpeas, and in addition to these, has been recorded as feeding on beggartick, hyacinth beans, alfalfa, sweet clover, adsuki bean, velvet bean, crimson clover, white clover, corn, grasses, eggplant, potato, squash, kudzu, okra, mug bean and some weeds.

INSECTICIDE TRIALS ON BEAN FOLIAGE

In contemplation of the control of this new and not widely distributed insect, the Pennsylvania Bureau of Plant Industry made the following tests on stringless green pod bean foliage during the growing season of 1925. The experiments were run at Harrisburg, Pa., which is outside of the known area of infestation, hence no rates of control could be determined. All applications were very thorough and directed toward both sides of the leaves, and were applied under the same conditions of temperature and moisture.

The following dusts and sprays gave no burning on bean foliage:

Magnesium arsenate as a dust:

Magnesium Arsenate	1	pound
Hydrated lime	5	pounds

Calcium arsenate as a dust:

Calcium arsenate	1	pound
Hydrated lime	9	pounds

Calcium arsenate-sulfur dust:

Calcium arsenate	1	pound
Dusting sulfur (200 mesh)	1	pound
Hydrated lime	4	pounds

Magnesium arsenate as a spray:

Magnesium arsenate	2	pounds
Water	100	gallons

Calcium arsenate as a spray:

Calcium arsenate	1½	pounds
Hydrated lime	3	pounds
Water	100	gallons

Arsenate of lead was also used as sprays and dusts with no burning. However, other workers have experienced quite a lot of burning with arsenate of lead, and it is not recommended for use on bean foliage.

Paris green in both dusts and sprays gave heavy burning of the foliage, as did sodium fluosilicate in the dust form. Hence it is not advisable to use these materials on bean foliage.

CONTROL RECOMMENDATIONS

The following control measures for the Mexican bean beetle have been worked out by the United States Department of Agriculture and are for southern conditions. A poison spray or dust is used. As has been stated, under some conditions bean foliage is easily "burned" by arsenate of lead sprays, hence this material should not be used.

For sprays use magnesium arsenate, two pounds to 100 gallons of water; or calcium arsenate, one and one-half pounds and three pounds of lime, to 100 gallons of water.

The following dusts have also proven effective controls in the south:

Magnesium Arsenate	1	pound
Hydrated lime	5	pounds
or		
Calcium arsenate	1	pound
Hydrated lime	9	pounds

The Alabama Agricultural Experiment Station recommends the following dust mixture:

Calcium arsenate	1	pound
Dusting sulfur	1	pound
Hydrated lime	4	pounds

These recommendations were tried on bean foliages outlined in a preceding paragraph; the number of applications made were such as to have given complete protection throughout the season, and the four formulae were found to be quite safe to use on bean foliage.

Any magnesium arsenate used for dust or spray mixtures should not contain more than five-tenths of one percent of water soluble arsenic pentoxide. Any calcium arsenate so used should not contain more than two-tenths of one per cent of water soluble pentoxide.

TIME TO SPRAY OR DUST

In infested areas the young bean plants should be sprayed or dusted as soon as the first leaves are unfolded. The application should be repeated at intervals of ten days to two weeks, keeping the foliage well covered throughout the growing season.

Green beans intended for food, gathered from sprayed or dusted plants, should be washed sufficiently to remove all spray residue; usually two thorough rinsings in clear water should be enough.

Much can be done in the control by cleaning the fields of crop remnants. These should be plowed under as soon as the beans are harvested. Waste places near fields should be burned over to destroy hibernating beetles.